New Storm Water Management Regulations

July 28, 2009

CITY OF WICHITA

Presentation Purpose

- To understand:
  - the new rules
  - why they are necessary
  - how they will be implemented
- To discuss what might need tweaking
- To prepare City Council for consideration and adoption of the new rules

Agenda

1. Drivers for New Rules
   - 2007 SW Permit
   - Increased Flooding
   - Channel Protection Needed
   - Storm Water Program effectiveness
2. Process Used for Rule Development
3. Overview of the New Rules
4. Implementing the New Rules

2007 NPDES SW Permit

- Requirements to use Best Management Practices (BMPs) to reduce pollutants identified by established Total Maximum Daily Loads (TMDLs)
- Required by October 1, 2009

TMDL Regulated Parameter	Associated Stream
Total Phosphorus	Little Ark River & Cowskin Creek
Total Nitrogen	Little Ark River and Cowskin Creek
Biological Oxygen Demand	Little Ark River and Cowskin Creek
Suspended Solids (Sediment)	Little Ark River and Cowskin Creek
Bacteria	Little Ark River, Cowskin Creek, Arkansas River and Whitewater River

Presented in City Council Workshop
November 6, 2007

2007 NPDES SW Permit

- Requires the use of BMPs to reduce the discharge of Principal Pollutants of Concern (PPoC) that KDHE identified from prior storm water testing
  - At a minimum must implement at least one BMP for each of the PPoC throughout the permitted area
  - Required by October 1, 2009
  - Pollutants are BOD, Total Recoverable Cadmium, Total Recoverable copper, Total Recoverable Zinc and E. Coli

Presented in City Council Workshop

November 6, 2007

2007 NPDES SW Permit

Implement at least six minimum control measures

1. Public Education and Outreach – due Oct. 1, 2008
2. Public Involvement and Participation – due Oct. 1, 2008
3. Illicit Discharge Detection and elimination – Oct. 1, 2009
4. Construction Site Stormwater Runoff Control – due Oct. 1, 2008
5. Post Construction Stormwater Management – due Oct. 1, 2009
6. Pollution Prevention/Good Housekeeping for Municipal Operations

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Control Measure #5 - Post Construction Stormwater Management:

- Post Construction Stormwater Management in new development and redevelopment including a full enforcement program identified below at a minimum for any project larger that one acre or part of a larger project
- Requirements:
  - ✓ BMPs to prevent or minimize adverse water quality impacts;
  - ✓ Strategies to include a combination of structural and/or nonstructural BMPs appropriate for the municipality;
  - ✓ Enact and ordinance to address post-construction runoff from new developments and redevelopment projects; and
  - ✓ Ensure adequate long-term operation and maintenance of BMPs
  - ✓ Sand pit/equus bed considerations

Presented in City Council Workshop

November 6, 2007

2007 NPDES SW Permit

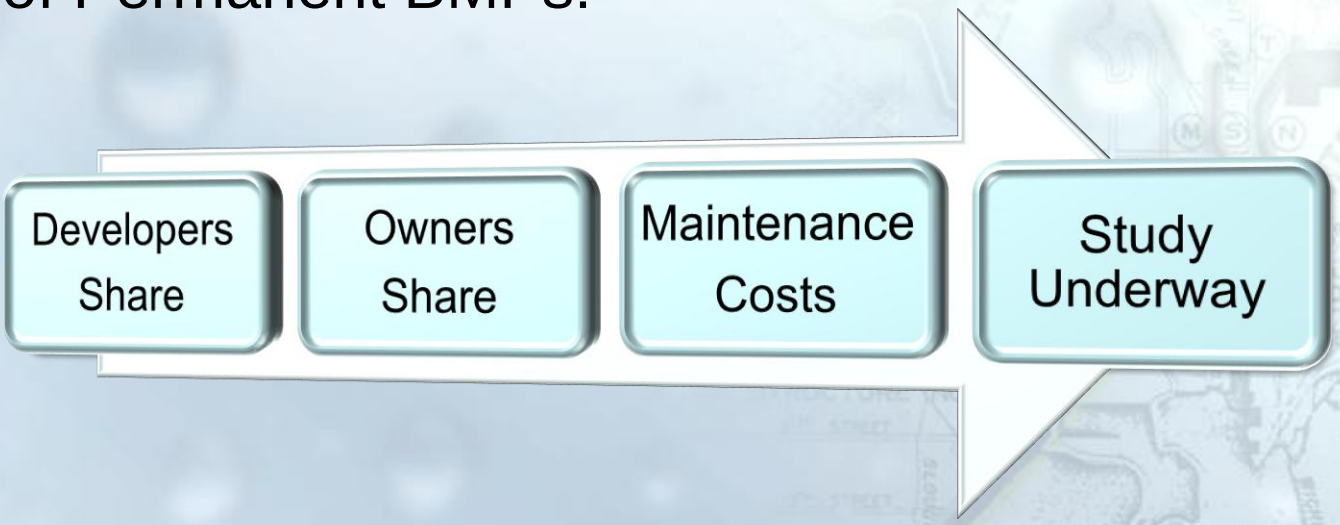
- Additional Monitoring Requirements
  - Quarterly storm water sampling at 8 locations
    - Began in 2008.
- Record keeping and Reporting Requirements
  - Status of compliance and goals met must be report annually with implementation schedule for additional activities

Presented in City Council Workshop

November 6, 2007

Costs to Comply with Permit Requirements

- Sampling – Estimated at $16,000 per year
- Cost to City for BMPs (TMDLs and PPoC) – Not yet Determined
- Cost of Permanent BMPs:



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Flooding Concerns

- Flooding concerns are increasing
- There is a need for consistent, comprehensive drainage design and flood protection rules, policies and design procedures

Effectiveness of Existing Program

- The current program is generally effective, except in the following two areas:

1. Construction Site Pollution Prevention
2. Permanent BMPs in areas of new development/redevelopment

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Presented in City Council Workshop

November 6, 2007

382 NOV's Issued to Builders in 2006

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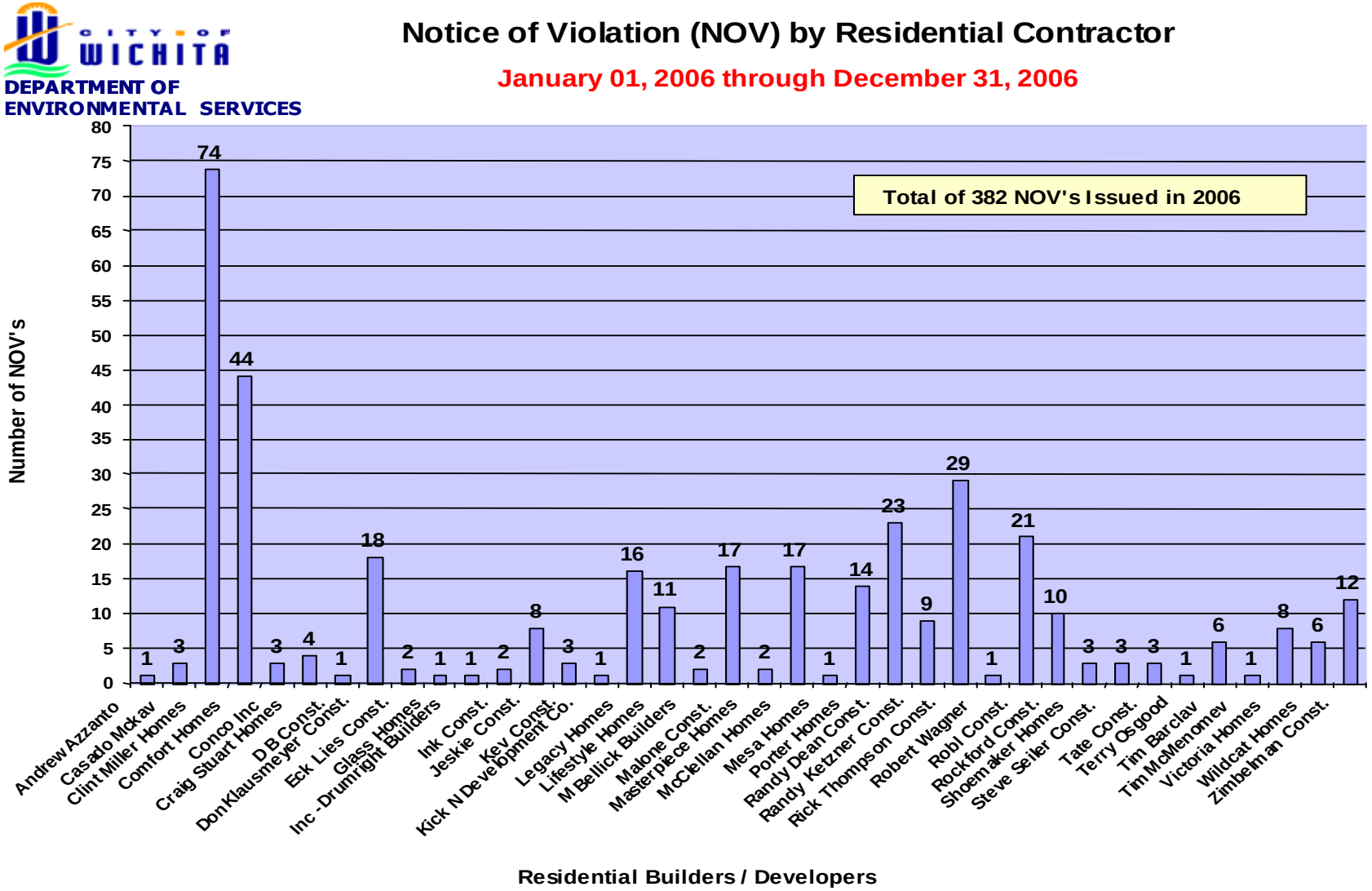
DEPARTMENT OF ENVIRONMENTAL SERVICES



At least, 566 NOV's Issued to Builders in 2007

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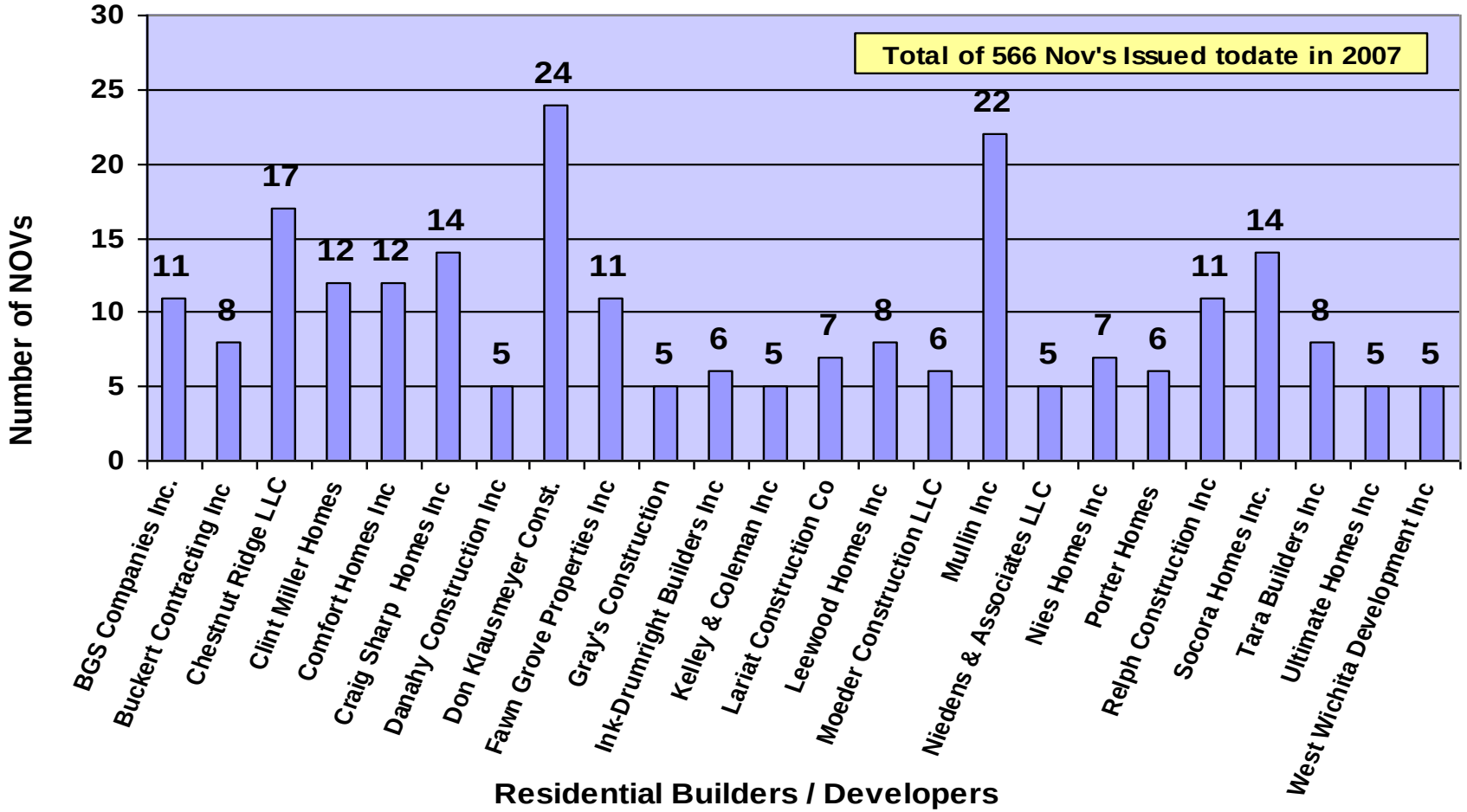
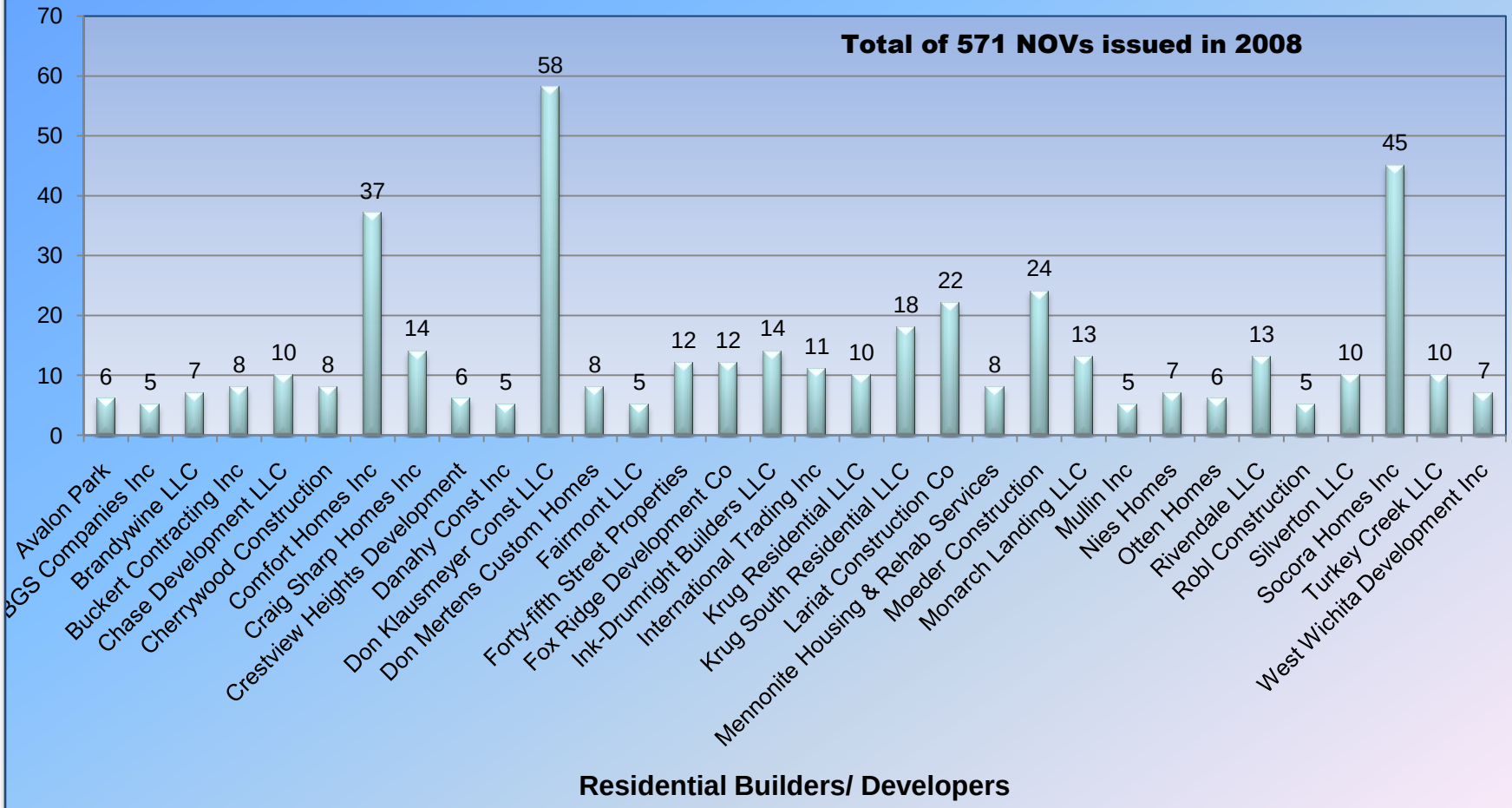
Notice of Violation (NOV) by Residential Contractor with 5 or more NOVs
January 01, 2007 through October 11, 2007

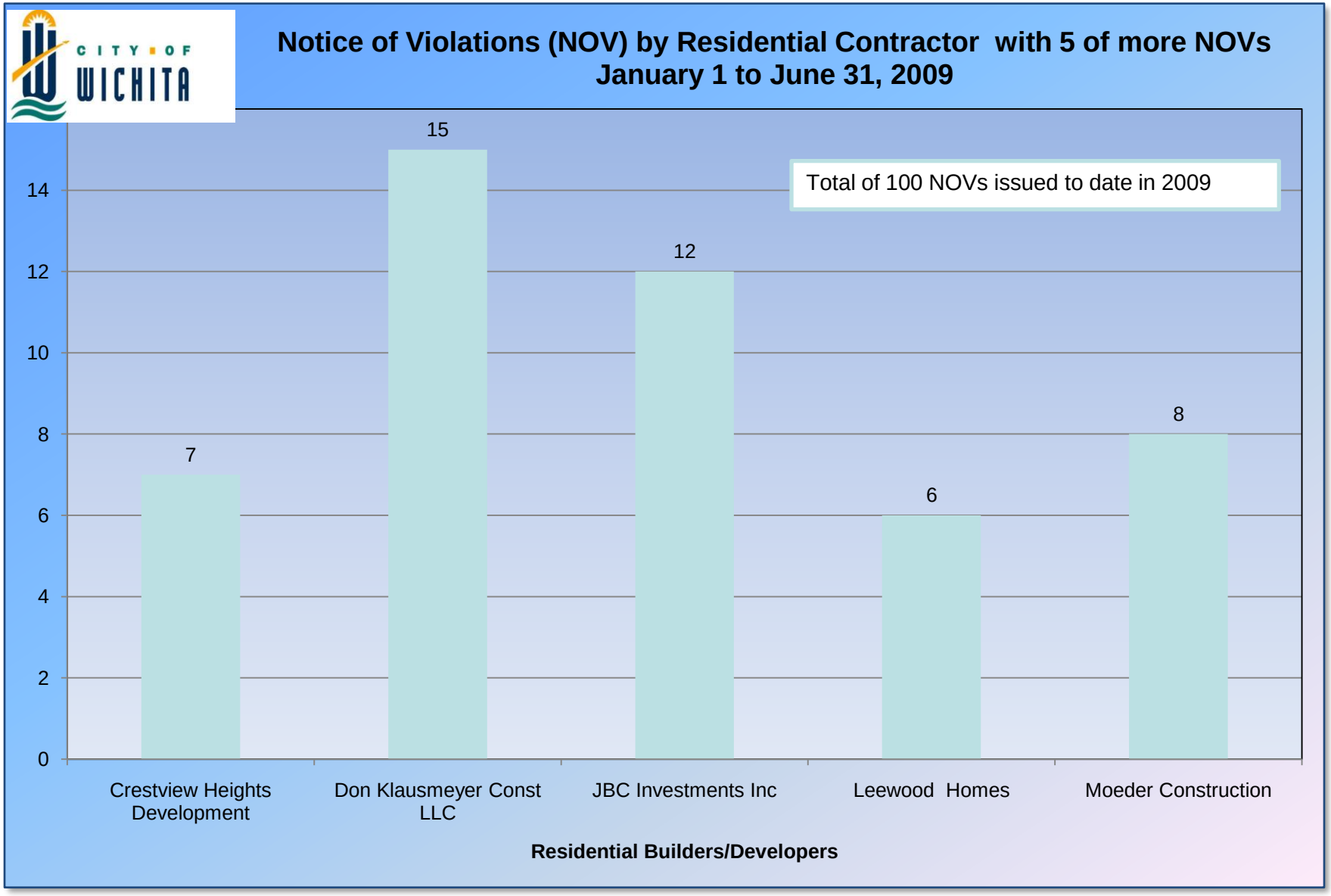


571 NOVS ISSUED TO BUILDERS IN 2008

Notice of Violations (NOV) by Residential Contractor with 5 or more Stormwater NOVs occurring in 2008



100 NOVS ISSUED TO BUILDERS TO DATE IN 2009



Developing the New Storm Water Rules

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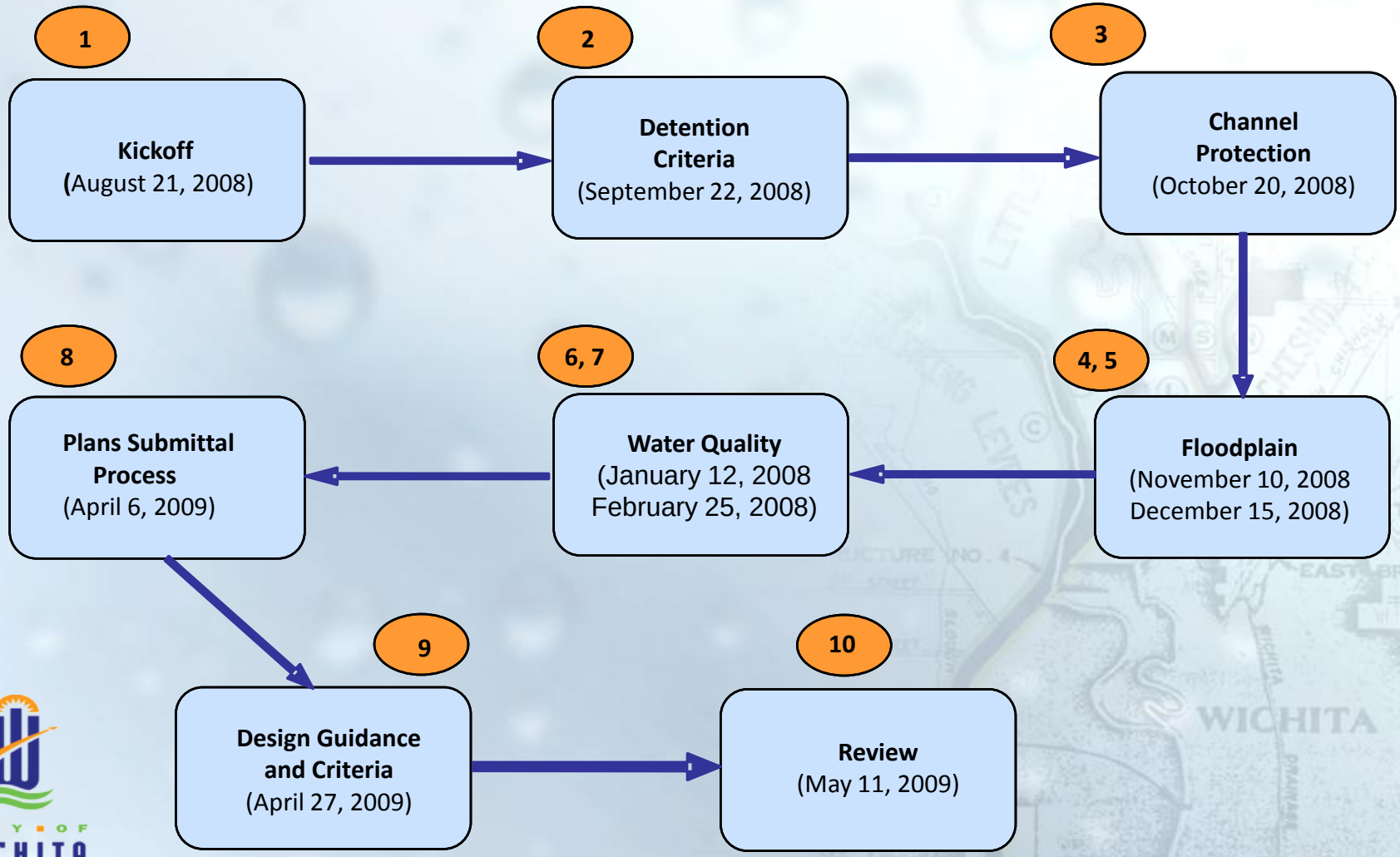
Technical Advisory Committee (TAC)

The mission of the TAC has been to provide guidance and advice on the development of the ordinances and manuals created through this process.

The TAC is a group of individuals selected from Wichita, Sedgwick County, the State of Kansas and Federal organizations, as well as local engineers and business leaders.

Dave Barber	Wichita/Sedgwick County MAPD
Richard Basore	Kansas Department of Health and Environment
Tim Boese	Groundwater Management District #2
Chris Bohm	Ruggles and Bohm PA
Clement Dickerson	SMAB member
Susan Erlenwein	Environmental Resources
Phil Frasier	Professional Engineering Consultants
Brian Glenn	Baughman Company PA
Trevor Kurth	Baughman Company PA
Scott Lindebak	Wichita Public Works
Jim Putman	U.S. Geological Survey
Christy Rodriguez	Wichita-Sedgwick County MAPD
Nadine Stannard	Associated Material & Supply Company
Rob Stutzman	NRCS
Jim Weber	Sedgwick County Public Works

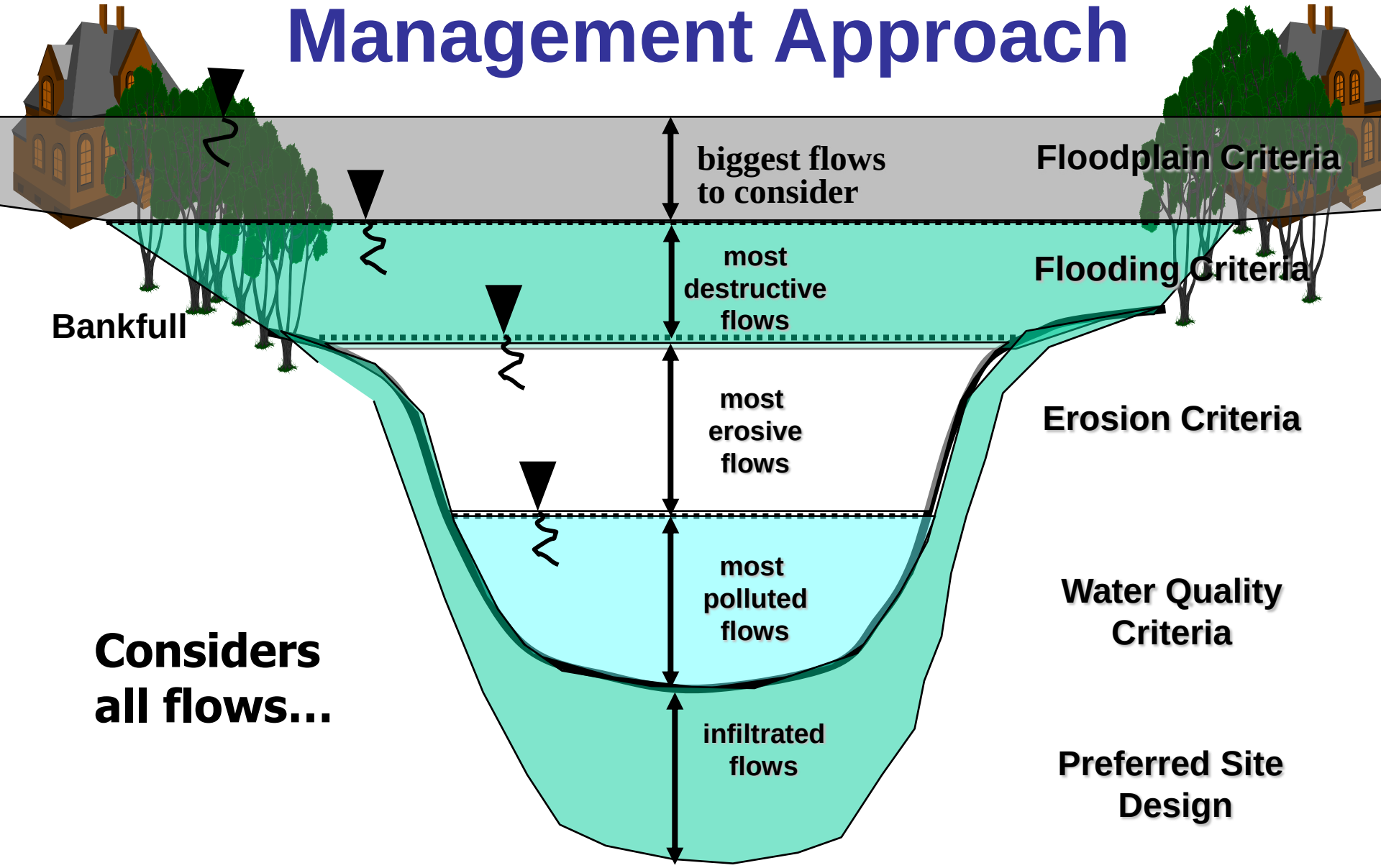
TAC Meetings



Development in Wichita

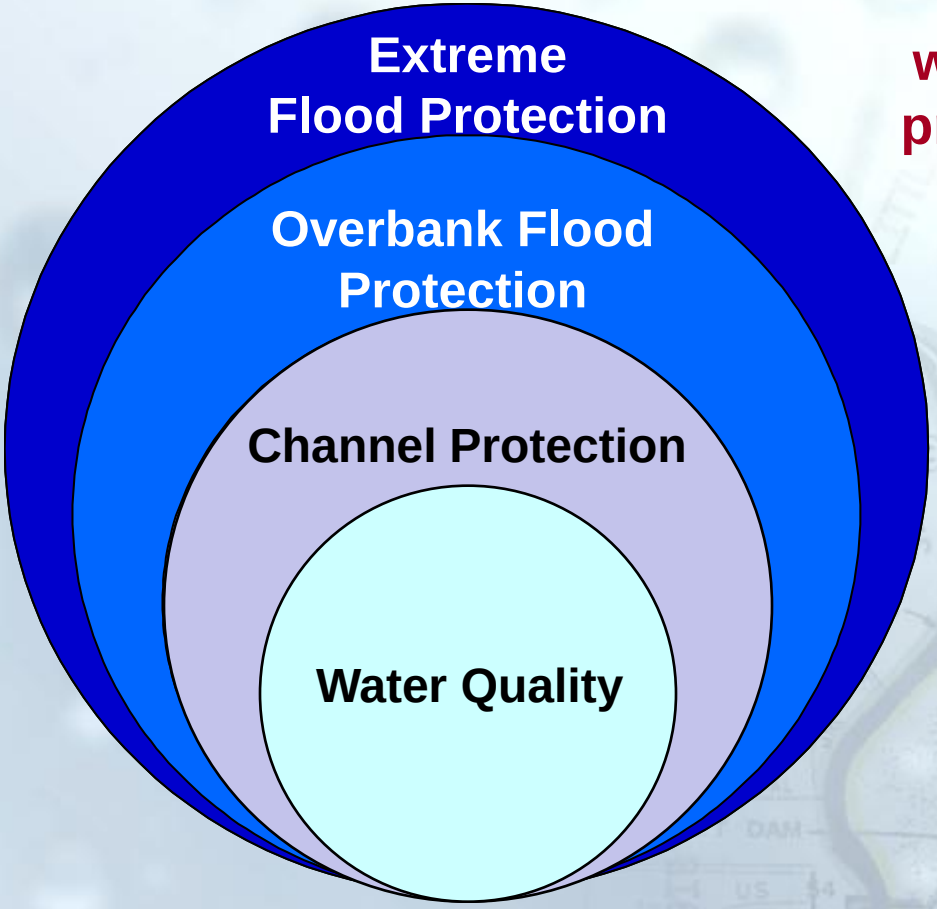
- Economic Growth and Development is good for the City
- But it can also
  - Increase flooding
  - Adversely impact surface and ground water quality
  - Cause downstream erosion
  - Adversely impact downstream properties
  - Reduce recreational opportunities
  - Overload infrastructure
  - Destroy habitat

Integrated Stormwater Management Approach



Considers all flows…

Integrated Site Design



BMP "nesting":

the BMPs for WQ will benefit channel protection and flood controls!

Highlights of the New Storm Water Rules

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New Rules at a Glance

Rule / Topic	Currently Required by Wichita?	Why Implemented or Improved?
Permanent water quality BMPs	No	Implemented for NPDES permit compliance
Temporary water quality BMPs	Yes	Retained for NPDES permit compliance
Channel erosion protection	No	Implemented for NPDES permit compliance
Flood/drainage protection	Yes	Improved to provide a higher degree of protection
Floodplain management	Yes	Improved to provide a higher degree of protection
Groundwater protection	No	Implemented as a policy consistent the City's long established goal of protecting water supplies
General drainage design	Yes	Improved to establish comprehensive, consistent drainage design policies and standards
Storm water plan contents	Yes	Improved to support new rules
Inspection, maintenance and enforcement	Yes	Improved for NPDES compliance

Format of New Rules

- **Storm Water Management Ordinance**
  - Added to the existing Storm Water Pollution Prevention Ordinance
    - Water quality BMPs, channel erosion protection, detention
    - Floodplain management (non-FEMA regulated areas)
    - Inspection, maintenance & enforcement
    - Notice of Violation (NOV) Requirement
- **Floodplain Management Ordinance** (FEMA Regulated floodplains)
  - Added to the existing ordinance
- **Storm Water Manual**
  - Comprehensive technical guidance for storm water system design, construction and maintenance
    - Volume 1: Storm Water Policies
    - Volume 2: Technical Guidance (design criteria, calculation examples, etc.)
    - Volume 3: Plans Submittal Guidance (plan preparation checklists, etc.)

Local & Regional Advantages

- **Comprehensive**
  - Water quality, water quantity, flooding and floodplain management
  - Regulations, policies, guidance and helpful tools
- **Written to address relevant local concerns**
  - Floodplain management
  - Localized flood protection
  - NPDES Permit & TMDL compliance
  - Site design flexibility
- **Written to encourage & allow regional use**
  - Model ordinance developed for City and County
  - Regional concerns considered in development
    - e.g., flooding and floodplain management

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Water Quality Approach

- **Necessary for NPDES SW Permit and TMDL compliance**
  - Address the primary pollutants of concern
  - Utilize structural and non-structural controls
  - To the Maximum Extent Practicable
- **An appropriate level compliance approach – not too little, not more stringent**
  - KDHE agrees that it meets the MEP
  - Approach used is common throughout east and mid-west United States

Water Quality Rules

- **New developments and redevelopments with 1 acre or greater of disturbed land**
- **Requirements:**
  - Treat a calculated volume of storm water runoff to remove 80% of Total Suspended Solids (TSS)
    - "The more you pave, the more you treat"
    - Use structural BMPs
  - Design, construct and maintain BMPs in accordance with City requirements
- **Presumptive compliance, no monitoring required**

80% TSS Removal Standard

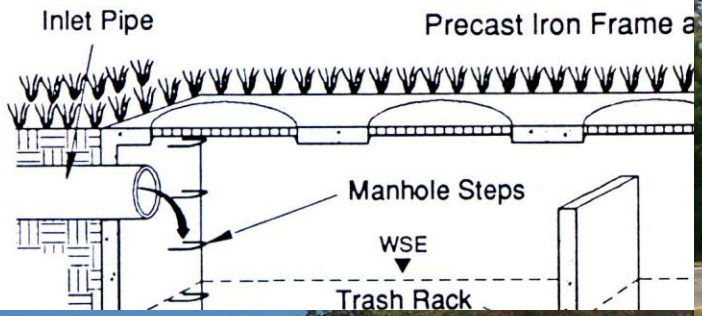
WQ Goal:

80% TSS Removal

- TSS is a measure of “sediment”
- Sediment is a TMDL regulated parameter
- Water Quality BMPs chosen for ability to remove TSS
- Other pollutants addressed too:
  - Pollutants adsorbed to sediment particles
  - Vegetative uptake in some BMPs (e.g., nutrients)
- 80% removal is an attainable and reasonable expectation
  - Used across the eastern and into mid-west US
  - Provide significant WQ treatment
  - But not cost-prohibitive

Water Quality Treatment

(Structural BMPs)



Accepted Water Quality BMPs

Table 3-1 Design Pollutant Removal Efficiencies for Storm Water Controls (Percentage)

Structural Control	Total Suspended Solids	Total Phosphorus	Total Nitrogen	Metals	Fecal Coliform
Storm Water Pond	80	55	30	50	70 g
Conventional Dry Detention Pond	a	a	a	a	a
Dry Extended Detention Pond	60	35	25	25	b
Underground Dry Detention Basin	a	a	a	a	a
Enhanced Dry Swale	90	50	50	40	b
Grass Channel	30	25	20	30	b
Infiltration Trench	90	60	60	90	90
Soakage Trench	90	60	60	90	90
Filter Strip	50	20	20	40	b
Surface Sand Filter	80	50	30	50	40
Organic Filter	80	60	40	75	50
Bioretention Area	85	60	50	80	b
Storm Water Wetland	75	45	30	50	70 g
Proprietary Treatment	c	c	c	c	d
Gravity Separator	c	c	c	d	d
Alum Treatment	90	80	60	75	90
Green Roof	e	e	e	e	e
Modular Porous Paver System	f	f	f	f	f
Porous Pavement	f	f	f	f	f

Small Commercial Sites

Small Commercial Sites

Small Commercial Sites

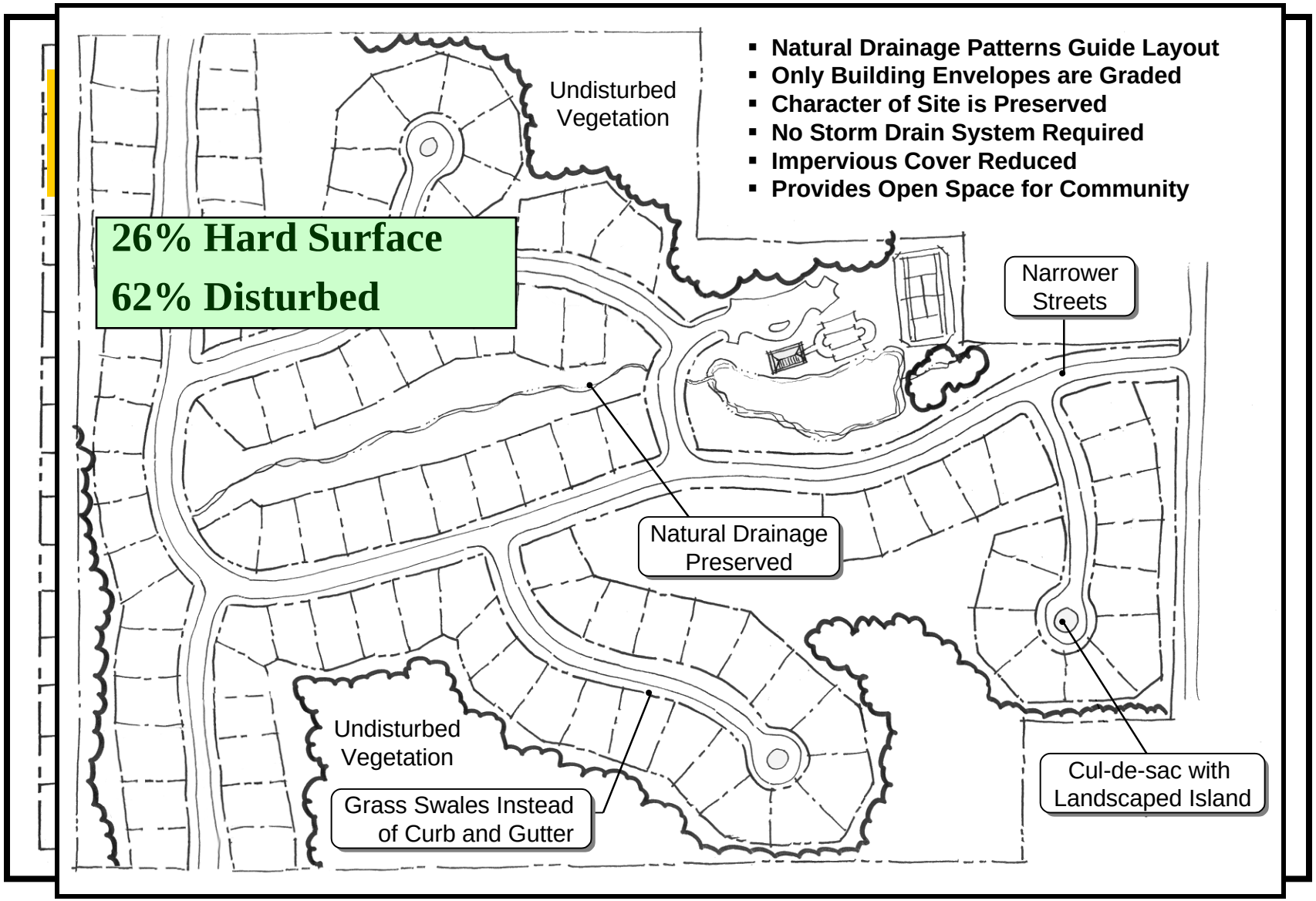
Small Commercial Sites

Small Commercial Sites

a for peak flow control only
b insufficient data to assign a value
c removal efficiency depends on specific device
d usually not applicable or determinable
e removal efficiency depends on specific installation
f must not be used to remove TSS due to clogging; use for quantity control only
g If no resident waterfowl population present

Water Quality Treatment

(Preferred Site Design practices)



Non-Structural BMPs

- Strongly encouraged, but *not required*
- Will help meet ordinance requirements
  - Less paved areas = less runoff to treat
  - Specific practices (e.g., preserving natural areas) yield greater volume reductions
- Provide significant site design flexibility
- Can reduce cost of development
  - Less clearing, less infrastructure, etc.
- Can reduce BMP sizes for WQ, erosion, detention

Channel Erosion Protection

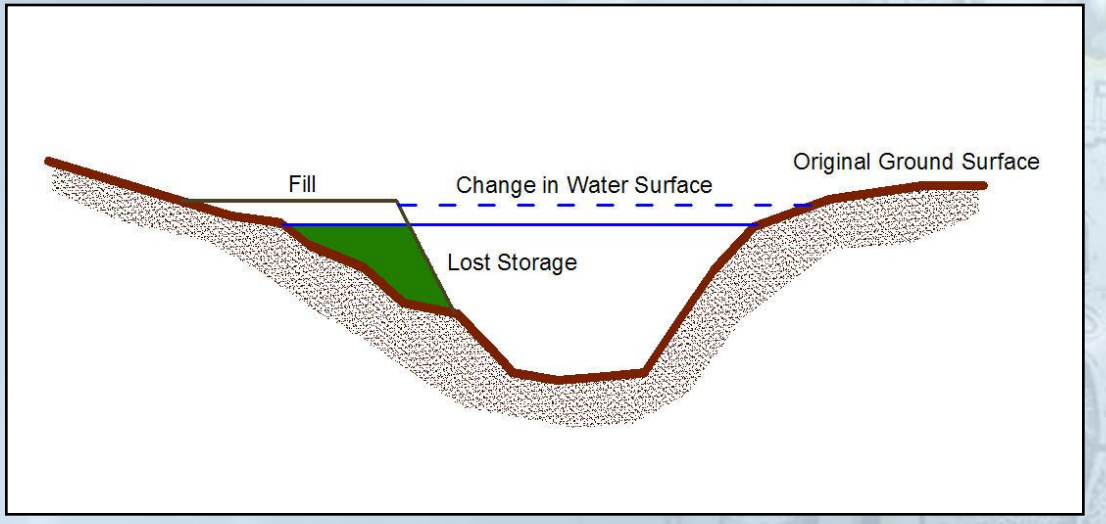
- Goals:
  - protect stream banks
  - reduce sediment loads
- Useful for NPDES & TMDL compliance
- Cost effective
  - BMPs treat WQ too
  - BMPs provide flood control
- Applicability: 1 acre and greater disturbed area

Flood Protection (Detention)

- Applicable to new developments and redevelopment with **1 acre or more of impervious area**
- Intended to avoid impacts of project on flooding for a **wide range of storm events (2-year to 100-year events)**
- Rule is **based largely on present design practices**
  - matching pre-development peak discharges
- Added emphasis:
  - peak discharges resulting from development must be analyzed and addressed downstream **(10% rule)**

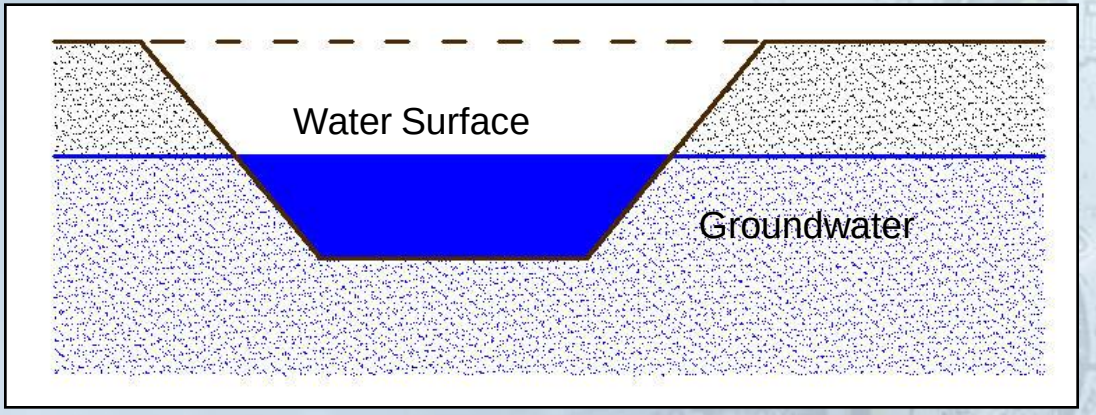
Floodplain Management

- Addresses:
  - the potential for impacts from construction fill placed in floodplains in locations where the flood potential is already high. Regulated via **volume compensation in selected basins**.
  - the potential for increased erosion caused by floodplain development.
  - **Elevation of new structures above flood levels** where existing flood maps are not sufficiently detailed.



Groundwater Protection

- Goal: to protect groundwater from storm water runoff pollutants
- Requires that **storm water runoff be treated for water quality prior to discharge** directly into groundwater-connected ponds or streams
- Provides for minimum vertical buffer distance between bottom of infiltration facilities and groundwater



General Drainage Design Criteria

Design Criteria for Development-Scale Flood Control and SWM Facilities

- Storm Sewers
- Inlets/Gutters
- Channels
- Culverts
- Detention Ponds
- Outlets/Energy Dissipaters
- Other Storm Water Management BMPs

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Implementing the New Rules

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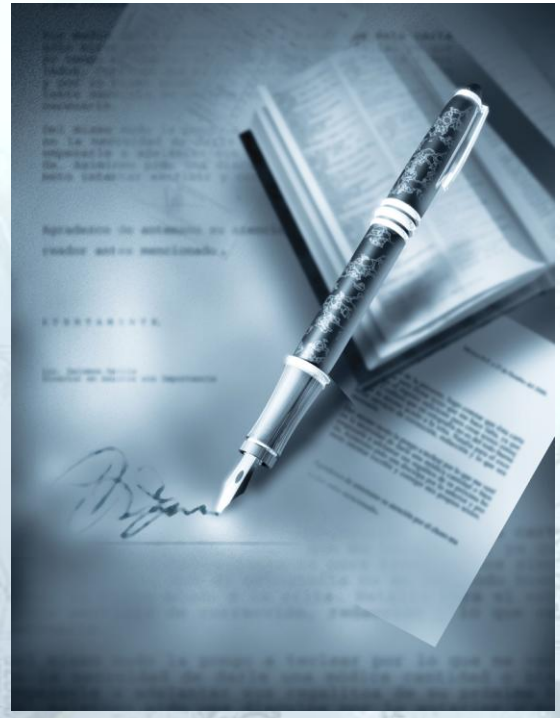
Site Planning & Design

- **The site design process remains largely the same**
  - Prelim plat, final plat, construction plan, & as-built
- **More information will be required on plans**
  - Plan content checklists for each stage of design in Volume 3
  - Detailed design & calculation guidance in Volume 2
- **Property owner must receive approval of the storm water plans prior to obtaining a building permit**
- **Pre-design conference with the City is encouraged**, not mandatory
  - Preliminary discussion of site design hurdles and opportunities

Operation & Maintenance Plan

- Required element of the drainage plan
- Must include:
  - A map depicting the storm water BMPs on-site
    - Clear identification and location of each facility
  - Maintenance guidance for each BMP on-site
    - Using same identification as that shown on map
    - Available in Volume 2 for all storm water BMPs
  - Storm Water Maintenance Covenants (maybe)
    - Property owner's agreement to maintain BMPs
    - Recorded with the plat (runs with the land)
    - Available in Volume 3



Maintenance and Inspection Checklists

STORM WATER RETENTION POND INSPECTION AND MAINTENANCE GUIDANCE

Regular inspection and maintenance is critical to the effective operation of storm water management facility as designed. The responsible party must maintain all storm water management facilities in accordance with the minimum design standards and other guidance provided in this manual. The approval authority may impose additional maintenance requirements where deemed necessary.

This page provides guidance on maintenance activities that are typically required for this storm water management facility, along with a suggested frequency for each activity. Individual storm water management facilities may have more, or less, frequent maintenance needs, depending upon a variety of factors including the occurrence of large storm events, overly wet or dry (i.e., drought) regional hydrologic conditions, and any changes or redevelopment in the upstream land use. Each responsible party shall perform the activities identified below at the frequency needed to maintain the pond in proper operating condition at all times.

Inspection Activities	Suggested Schedule
• After several storm events or an extreme storm event, inspect for: bank stability; signs of erosion; and damage to, or clogging of, the inlet/outlet structures and pilot channels.	As needed
• Inspect [illegible] excessive growth should [illegible] settlement	
• Inspect [illegible] pilot ch	
• Check [illegible]	
• Note si [illegible]	
• Check [illegible]	
• Check [illegible]	
• Note c [illegible] performance.	

Maintenance Activities	Suggested Schedule
• Clean and remove debris from inlet and outlet structures. • Mow side slopes (embankment) and maintenance access. Periodic mowing is only required along maintenance rights-of-way and the embankment. The remaining pond buffer can be managed as a meadow (mowing every other year) or forest.	Monthly
• If wetland vegetation is included, remove invasive vegetation.	Semi-annually
• Repair damage to pond, outlet structures, embankments, control gates, valves, or other mechanical devices; repair undercut or eroded areas. • Remove pollutants or algal overgrowth as appropriate.	As Needed
• Perform wetland plant management and harvesting.	Annually (if needed)
• Remove sediment from the forebay. Sediments excavated from storm water ponds that do not receive runoff from land uses that require a Special Pollution Abatement Permit (SPAP) are not considered toxic or hazardous material and can be safely disposed of by either land application or landfilling. Sediment testing is required prior to sediment disposal when the pond receives discharge from a land use that requires a SPAP. Dispose of sediments per Section 10.3.	5 to 7 years or after 50% of the total forebay capacity has been lost
• Monitor sediment accumulations, and remove sediment when the pond volume has become reduced significantly or the pond is not providing a healthy habitat for vegetation and fish (if used). Discharges of pond water may be considered an illegal discharge by local ordinances. Care should be exercised during pond drawdowns to prevent downstream discharge of sediments, anoxic water, or high flows with erosive velocities. The appropriate authority should be notified before draining a storm water pond.	10 to 20 years or after 25% of the permanent pool volume has been lost

The inspection checklist that is presented on the next page is provided to guide the responsible party in the inspection and maintenance of the storm water management facility. The approval authority may require the use of this checklist or other form(s) of maintenance documentation when and where deemed necessary in order to ensure the long-term proper operation of the storm water management facility. Questions regarding the storm water management facility inspection and maintenance should be referred to the approval authority.

STORM WATER RETENTION POND INSPECTION CHECKLIST

Location: _____ Owner Change since last inspection? Y N

Owner Name, Address, Phone: _____

Date: _____ Time: _____ Site conditions: _____

Inspection Items	Satisfactory (S) or Unsatisfactory (U)	Comments/Corrective Action
Embankment and Emergency Spillway		
Healthy vegetation?		
Erosion on embankment?		
Animal burrows in embankment?		
Cracking, sliding, bulging of dam?		
Blocked or malfunctioning drains?		
[illegible]		
Other (describe)?		
Sediment Forebays		
Evidence of sediment accumulation?		
Permanent Pool Areas (if applicable)		
Undesirable vegetation growth?		
Visible pollution?		
Shoreline erosion?		
Erosion at outfalls into pond?		
Headwalls and endwalls in good condition?		
Encroachment by other activities?		
Evidence of sediment accumulation?		
Dry Pond Areas (if applicable)		
Vegetation adequate?		
Undesirable vegetation growth?		
Excessive sedimentation?		
Hazards		
Have there been complaints from residents?		
Public hazards noted?		

If any of the above inspection items are **UNSATISFACTORY**, list corrective actions and the corresponding completion dates below:

Corrective Action Needed	Due Date

Inspector Signature: _____ Inspector Name (printed) _____

Will be provided in the manual for each storm water BMP

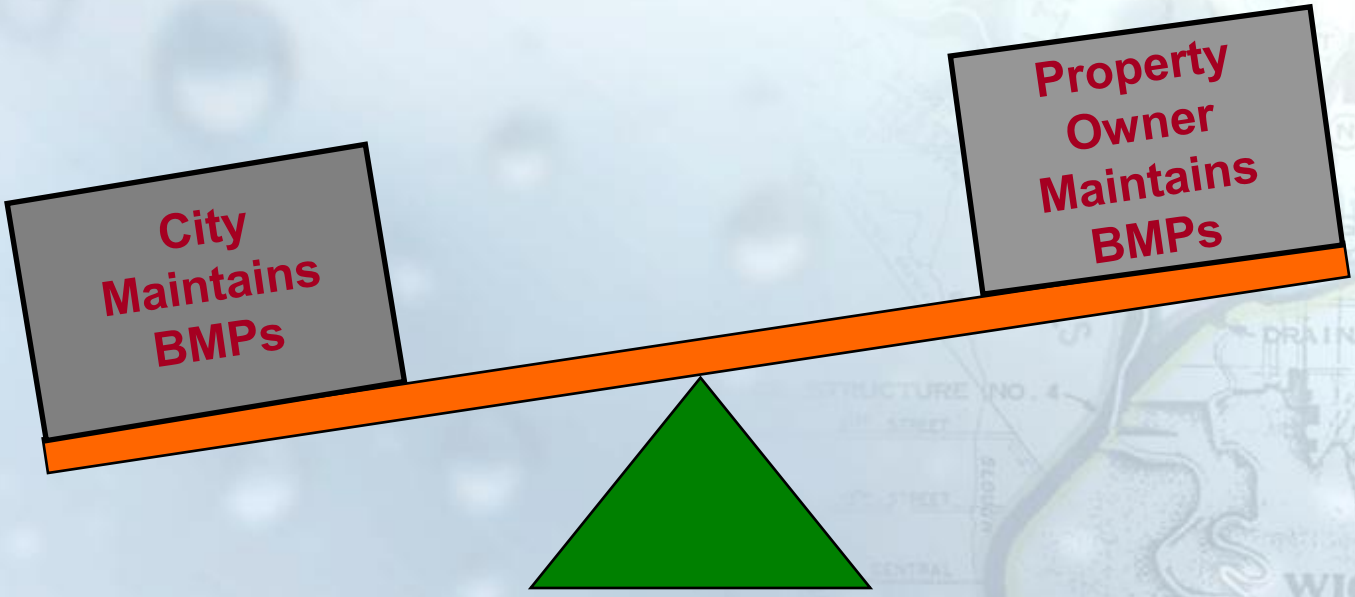
After Construction

Storm Water Facility Maintenance and Inspection

- Necessary for NPDES Phase I compliance to “ensure long-term operation”
- Applies to storm water BMPs on new developments and redevelopments
- Does not apply to existing detention ponds and BMPs
- Will require education for property owners and City staff
- Several options on how to do this

Maintenance Options

"Who Maintains?" is a common question!



Property Owner Maintains BMPs

- Approach included in proposed ordinance
- Storm Water Maintenance Covenants included with O&M Plan
- Property owner inspects and maintains in accordance with O&M Plan
  - O&M Plan recorded with plat specifies what BMPs are on the property
  - Inspection/maintenance guidance (Volume 2) with O&M Plan
  - Inspection/maintenance documentation (Volume 2) with O&M Plan
- City inspects, enforces and requires/takes corrective actions
  - Each BMP will be in an easement, Also Ordinance and Covenants give right-of-entry
  - Inspections on some regular frequency (e.g., usually annually)
  - Enforcement (NOVs, fines, penalties) where necessary

Pros

- Least cost for City

Cons

- Residential property owners don't understand BMP maintenance
- Residential BMPs may not be maintained
- Difficulties with property ownership transfers
- Enforcement can be difficult

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City Maintains BMPs

- Storm Water Maintenance Covenants not needed
- Property owner performs routine maintenance
  - Mowing, pruning, vegetative/aesthetic maintenance
- City inspects regularly
- City performs “heavy” maintenance
  - Sediment removal
  - Dam/berm reconstruction
  - Outfall repair/replacement

Pros

- Assurance of permit compliance
- No property owner issues
- BMPs will be maintained well

Cons

- Highest cost to City
- Access to BMPs

Other Option?

- City maintains residential BMPs, property owners maintain non-residential BMPs
  - Residential property owner performs routine maintenance
    - Mowing, vegetative/aesthetic maintenance
  - City inspects everything regularly
  - City enforces maintenance requirements on non-residential
  - City performs heavy maintenance for residential
  - Consider: City could also offer to maintain existing BMPs once the current owner brings them into compliance with new rules

Enforcement Changes

- Enforcement improvements needed to address:
  - new “crop” of stakeholders (i.e., property owners with sw facilities);
  - current problems with repeat offenders on construction sites;
  - ensure continued compliance with NPDES Phase I permit
- Modification of existing enforcement approach
- Improvements:
  1. Include penalties and fines associated with post-construction violations
  2. Expand administrative penalties to address some problematic offenses:
     - Failure to install construction site BMPs prior to grading
     - Failure to clean-up sediment releases
  3. Allow graduated fines for repeat offenders

Who is Grandfathered?

Proposed date new rules become effective: **March 1, 2010**

Development Type	Date subject to new rules
New plats (approved after March 1, 2010)	March 1, 2010
Existing plats with an approved meaningful subdivision drainage plan (approved before March 1, 2010)	March 1, 2011* *only if site infrastructure not installed
Residential and non-residential sites that do not have an approved drainage plan	March 1, 2010

- Site infrastructure means the storm water system and roadways
- If not installed by March 1, 2011, owner must get approved drainage plan showing compliance with new rules prior to construction start

What is Grandfathered?

Rule / Topic	Subject to Grandfathering?
Water quality BMPs	Yes
Channel erosion protection	Yes
Flood/drainage protection	Yes
Floodplain management	Yes
Groundwater protection	Yes
General drainage design	Yes
Storm water plan contents	Yes
Inspection and maintenance	Yes
Enforcement	No

Upcoming Events

- Receipt of Council comments
- Storm Water Ordinance to be considered Council prior to October 1, 2009
- Fall 2009 and Winter 2010 - Training for:
  - City staff and inspectors
  - Local site developers, site design engineers and architects

The work doesn't end here…

- **Challenges continue to grow in complexity**
  - Economic growth = greater need for storm water management
  - Flooding continues to be a primary driver for storm water operations
  - NPDES regulations will get tighter
- **Resources are limited** (operations and capital)
  - How do we pay for increased operations resulting from new rules?
- **Watershed planning** is necessary to:
  - Understand critical watersheds (flooding perspective)
  - Ensure appropriate levels of storm water regulation and service throughout Wichita
  - Prioritize flood planning and capital improvement needs
- Many **stakeholder expectations need to be addressed**
  - Regulators: comply with water quality rules
  - Ratepayers: provide reasonable and cost-effective storm water management
  - City: balance stakeholder desires with greater need for storm water management

Questions?